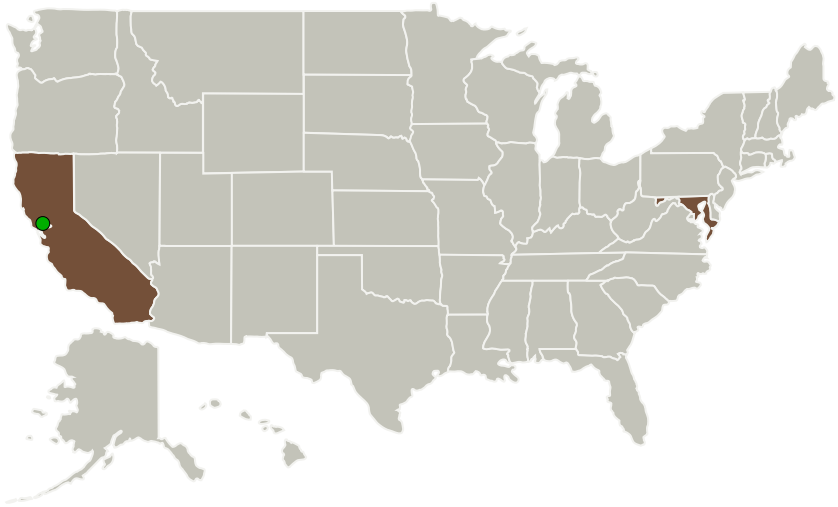
# A High Performance Approach to Improving Auscultation Capability in Noisy Environments, Phase I

Completed Technology Project (2011 - 2011)

## Project Introduction

Some commercial auscultation devices pick up all sounds without filtering out the background noise. Although the electronic stethoscopes made by 3M and Thinklab have some simple built-in filters, those filters cannot differentiate important internal body sounds from interfering background noise. Other devices used Doppler effects, which cannot be easily interpreted by physicians. We propose a high performance approach to enhancing auscultation capability. The idea is to utilize a second microphone to pick up the background noise and then use the microphone signals to improve the quality of stethoscope signals. There are several key advantages of our approach. First, the second mic is attached to a recorder, which is independent of the stethoscope. That is, the current stethoscope can still be used without any modifications. Second, the background noise level in the stethoscope will be reduced significantly, as we will apply advanced and fast algorithms to eliminate the background noise. Two algorithms will be evaluated. One is based on adaptive filtering, which is a time-domain approach. The other one is based on spectral subtraction with multi-band scaling. These algorithms have been applied by our team to speech enhancement applications in very noisy environments such as battlefield and also astronaut's helmet.

## Primary U.S. Work Locations and Key Partners




A High Performance Approach to Improving Auscultation Capability in Noisy Environments, Phase I

## Table of Contents

**Small Business Innovation Research/Small Business Tech Transfer**

# A High Performance Approach to Improving Auscultation Capability in Noisy Environments, Phase I

Completed Technology Project (2011 - 2011)

| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Signal Processing, Inc. | Lead Organization | Industry<br>Minority-Owned Business, Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB) | Rockville, Maryland |
| Ames Research Center(ARC) | Supporting Organization | NASA Center | Moffett Field, California |

| Primary U.S. Work Locations | |
|---|---|
| California | Maryland |

## Project Transitions

**February 2011:** Project Start

**September 2011:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/137819)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Signal Processing, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

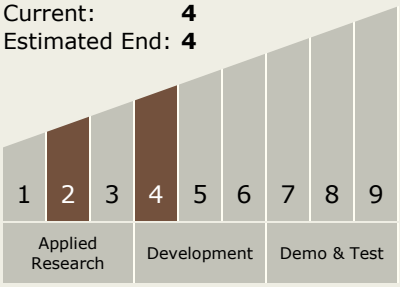
Carlos Torrez

**Principal Investigator:**

Chiman Kwan

## Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



# A High Performance Approach to Improving Auscultation Capability in Noisy Environments, Phase I

Completed Technology Project (2011 - 2011)

## Technology Areas

**Primary:**

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.1 Medical Diagnosis and Prognosis

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System